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Morphology of fullerene-free bulk heterojunction blends for photovoltaic applications

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Over the last decades, the focus of research has been shifted towards the field of organic electronics due to their advantageous properties, such as low-cost manufacturing processes, versatility, flexibility, as well as their tunable characteristics, such as absorption and solubility. These properties open up a wide range of applications, especially, in the field of photovoltaics. Hence, organic photovoltaics represent a promising alternative for the conventional inorganic photovoltaics. Even though the power conversion efficiency is lower than the ones of conventional devices, values of over 16% have been reported and thus receive industrial attention for commercialization. We study the inner morphology of a low band gap, fullerene-free bulk heterojunction blend, namely PBDB-T and ITIC of different compositions with grazing-incidence small-angle X-ray scattering (GISAXS). The obtained structural information is correlated with current density voltage characteristics and the absorbance of the active layer in order to improve the efficiency.

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